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STATE OF ILLINOIS

B. Geology/Hydrology

1. General

Brighton Landfill is located in an upland area in the extreme Southwestern corner of Macoupin County, Illinois. This area is characterized by its steep ridges and valleys and considerable topographic relief. Much of the area is wooded.

Subject site is situated on a plateau of sorts. The site is flanked on three sides by a series of streams which drain the uplands. This feature is readily evident on the site map and is best illustrated by the heavy line identified as the "compliance point".

The entire state of Illinois has been mapped (generally) by the Illinois State Geological Survey (ISGS) in terms of relative suitability for the shallow burial of Municipal Solid Waste (the predominant receipts of Brighton Landfill). Plate 1, attached to this section, is a color coded exerpt from that effort which deals only with Macoupin County. Brighton Landfill is identified on that map as being in an area of "G" classification. This is the best classification awarded by ISGS in terms of defining the lowest risk to groundwater. Shallow aquifers in Illinois have also been mapped. Plate 2, attached, identifies said aquifers in Macoupin County. This mapping, dated January, 1980, was done by IEPA as part of a U.S.EPA sponsored inventory of surface impoundments. Brighton Landfill is at least ten miles from any of the aquifers identified by IEPA at that time.

Both the Illinois State Water Survey (ISWS) and ISGS have issued opinions concerning the site. The ISWS letter of December 3, 1974 and the ISGS letter of January 13, 1975 are attached to this section.

2. Aquifer Identification

The subsurface at the subject site consists of a thin sheath of topsoil and wind deposited loess, thence a thick deposit of glacial till which is, in turn, underlain by Pennsylvanian age bedrock. The surface soils (topsoil and loess), which are generally on the order of 8' - 12' thick, are absent locally where landfilling has taken place. The underlying till, which varies in thickness from approximately 50' - 80', consists of fine grained deposits which contain occasional pockets or lenses of coarse grained sand. The sand deposits are sporadic and there is no evidence of any overall interconnection. Underlying rock is shale.

At this writing, the site has been subjected to dozens of soil borings and attendant soil tests for grain size, permeability, porosity and other pertinent properties. In addition, a total of 28 monitoring wells and three piezometers are now in place on the site. Of these, 17 wells are screened in the shallow till, at or near the water table, and 11 wells are screened in the deeper till. Both shallow and deep wells have been subjected to field tests for transmissibility by bailer or slug tests and resultant field (i.e. secondary) permeability figures, coupled with measured hydraulic gradients and an estimated effective porosity ($N_e = 0.1$), have been used to estimate seepage rates throughout the site. All of this information has been compiled and made part of this portion of the application. Said information is found either in the Subpart F attachments or is contained in the Subpart F engineering report.

Data just mentioned, and numerous on-site investigations by the site engineer, coupled with an understanding of the applicable fundamental principles of hydrogeology, result in the following conclusions:

i. Recharge to groundwater occurs locally (as opposed to regionally) by precipitation. Infiltration, precipitation minus runoff and evapotranspiration, is estimated to be on the order of 3.5 inches per year.

ii. The discharge points for groundwater beneath the site are defined by the small streams which flank the site on three sides (see "water balance" in the Subpart F Engineering Report).

iii. The glacial till can be considered as two units; upper till and lower till. The upper till, generally the upper 25'-30', is weathered and fractured and serves to drain most infiltration into the surrounding streams. The lower till is only mildly fractured and has little water bearing capacity. Measured transmissibilities in the upper and lower till averaged 16.58 and 0.585 gpd/ft. It might be noted that it is not unusual for transmissibilities of Illinois aquifers to be excess of 100,000 gpd/ft.

iv. Laboratory permeabilities for the upper and lower (fine grained) till averaged 8.46×10^{-8} cm/sec and 1.01×10^{-8} cm/sec., respectively. Corresponding field (secondary) permeabilities averaged 1.36×10^{-4} cm/sec and 1.09×10^{-6} cm/sec.

v. Computed seepage rates in the upper till, which were highest near surrounding streams, averaged 33.1 feet per year but were as low as 1.3 feet per year. Computed seepage rates in the lower till averaged 0.24 feet per year. For practical purposes, they are nil.

vi. The till, which is reportedly from the Illinoisian glaciation, is liberally sprinkled throughout with coal fragments. John Mathes & Associates, Inc. have speculated that the Kansan glacier may have also passed through in that Kansan glacial till is known to contain organics.

vii. Flow in the upper till occurs under "water table" conditions. However, the lower till behaves much like shale and any flow therein occurs under "leaky artesian conditions". Recharge to both units is local and discharge from both units is to nearby surface streams. It is not known if underlying shale is fractured but, if so, both recharge and discharge points would be the same as with the till. Plate 3, attached to this section, identifies at a glance the pertinent hydrogeologic features of the site.

The potential impact of Brighton Landfill is limited to a portion of the local drainage basin(s) that is not much greater in size than the landfill itself. The area in question is identified in the water balance map contained in the Engineering Report. There are no known potable water wells in use in this area nor are there likely to be any in that city water is available. The expense of installing a large diameter dug well exceeds that of tapping on to the city water line. Moreover, water contained throughout much of the lower till is of such poor quality that it is unsuitable for use as drinking water, either by humans or livestock. As discussed in Section C of the Subpart F, this water has been shown to contain Sulfate concentrations in excess of 1000 mg/l which, apparently, are not the result of landfill activity.

Boiled down, the only groundwater of note at the facility is contained in the upper till. That water, which is subject ...

sparse yields and/or unsuitable quality, is not used by the public and is not likely to be used. Said water, often referred to as "perched" groundwater to reflect its position atop the underlying lower till, is similar to that of at least two other RCRA hazardous waste sites that the author is familiar with and which in both cases was not considered an aquifer for purposes of RCRA compliance. In one of these cases (Re: WMI (ESL) v. IEPA) the Illinois Pollution Control Board was apparently in substantial agreement. Moreover, it is felt that the upper till is not an aquifer as the term is generally taken nor as intended by RCRA. And, based on Plate 2., the till was apparently not considered an aquifer by IEPA in 1980.

Based on the above, and in the strict legal sense, Part 264, Subpart F does not appear applicable to Brighton Landfill. However, it is subject site's opinion that this would not serve the public well, particularly at a time of such heightened public anxiety concerning the management of hazardous waste. In this light, Brighton Landfill is proposing to monitor the upper till in an extensive fashion that dovetails in all respects with the requirements of Subpart F.

3. Direction and Rate of Flow

Groundwater flow at the site and in surrounding areas generally corresponds to surface topography. Consequently, flow is multi directional. This can be seen on the site map and is further illustrated in the potentiometric surface map included in the Engineering Report. Seepage rates are computed and mapped in the Engineering Report. As said computations reveal, the rates of flow are highly variable and tend to be greatest near the steep slopes where groundwater discharges.